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(72) Inventor FRITZ LEBER


## (54) PLANET WHEEL CARRIER


(71) We, ZAHNRADFABRIK FRIEDRICHSHAFEN AKTIENGESELLSCHAFT, of Friedrichshafen-on-the-Bodensee, Federal Republic of Germany, a Joint-Stock Company organised under the laws of the Federal Republic of Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:–


This invention relates to planet wheel carriers.

Planet wheel carriers are frequently made from a one-piece blank, which may be forged, welded, or cast (French Patent Specification 1,089,588) or burned-out (German Utility Model 7,512,419), while the abutment surfaces for laterally guiding the planet wheels are locally machined by milling. In one known planet wheel carrier of this kind (German Utility Model 7,512,419) continuous machining in the peripheral direction is possible only for an extremely narrow abutment surface which lies in the region of the inside diameter of the webs and of the inner enveloping circle of the holes for mounting the planet wheels, while by far the greater part of the surface surrounding the holes cannot be reached.

The planet wheel carrier of the above-mentioned French Patent Specification has abutment surfaces completely surrounding the holes, but these partly extend into the diameter region of the webs, so that they cannot be completely continuously machined in the peripheral direction by cutting methods. The remaining surfaces must be additionally machined in other ways, which gives rise to considerable expense and generally has the consequence that the differently machined parts of the abtument surfaces merge into one another in the form of steps, which may be disadvantageous for axial mounting.

The invention aims at producing planet wheel carriers, including the abutment surfaces, in an inexpensive manner.

To this end, the present invention consists in a planet wheel carrier of one-piece construction, comprising a disc member, an annular side plate member and a plurality of webs which are spaced apart in the circumferential direction of said disc member and side plate member and which coaxially connect said members together, the inner faces of said webs lying on a circle of predetermined diameter, said disk member and side plate member having within said circle, axially aligned holes for the mounting of the planet wheels between said members and on their inner faces an annular abutment surface, completely surrounding the holes in the respective member, for laterally guiding the planet wheels, the abutment surfaces having been machined in the radial direction up to a machining diameter which is smaller than the diameter of said circle and larger than the outer diameter of said annular abutment surfaces in the regions between said webs.

By virtue of such construction the abutment surfaces can be machine simultaneously and completely by inexpensive turning, whilst nevertheless obtaining abutment surfaces free from disturbing edges and steps. Advantageously, each abutment surface in the region between said webs adjoins radially a depression, the radial boundary lines of which lie in a plane of the adjacent end faces of the webs. Since the depressions can be made relatively shallow, no undesired increase in the dimensions of the planet wheel carrier is necessary.

In order that the invention may be more readily understood, reference is made to the accompanying drawings which illustrate one embodiment thereof, and in which:–

Figure 1 is an axially parallel section of a planet wheel carrier; and

Figure 2 is a section perpendicular to the axis, taken on the line II-II of Figure 1.

The planet wheel carrier shown in Figures 1 and 2 is of one-piece construction and consists of a disc 11, an annular side plate 10 and four webs 12 which coaxially connect together the disc 11 and side plate 10, and which are spaced apart in the circumferential direction of the disc 11 and side plate 10. The inner faces of the webs 12 lie on a circle having a diameter 21. The number of webs here corresponds to the number of planet wheels (not shown) to be carried, which are disposed in radial openings 13 between the webs and mounted on bearing pins (not shown) supported in planet wheel holes 14.

The lateral guiding of the planet wheels is effected by annular abutment surfaces 15 and 16 on the inner plane surfaces 17 and 18 of the side plate 10 and disc 11, these surfaces being produced by facing on a lathe to a machining diameter 20. The diameter 20 extends almost to the inside diameter 21 of the webs 12, but, in order to ensure undisturbed and simpler machining, contact between the turning tool and the diameter 21 of the webs is avoided.

In order to prevent the formation of edges, which would disturb the mounting of the planet wheels, at the limit imposed by the turning diameter 20 in the machining of the abutment surfaces 15 and 16, shallow depressions 22, 23 are provided adjacent the abutment surfaces on the inner plane surfaces 17, 18 of the side plate 10 and disc 11 in the region of the openings 13 between the webs 12, the bottom surfaces 27 of which depressions are not reached by the turning tool. The inner boundary line 24 of the depressions extends inside the turning diameter 20 and outside the planet wheel holes 14, so that the abutment surfaces 15, 16 on the one hand have no projecting edges in the bearing zone of the planet wheels, despite the turning diameter 20 extending in this region, and on the other hand completely surround the planet holes 14. The radial boundary lines 25 of the depressions 22, 23 lie in a plane of the adjacent end faces 26 of the webs 12, so that the blank can be simple in shape.

WHAT WE CLAIM IS:—

1. A planet wheel carrier of one-piece construction, comprising a disc member, an annular side plate member and a plurality of webs which are spaced apart in the circumferential direction of said disc member and side plate member and which coaxially connect said members together, the inner faces of said webs lying on a circle of predetermined diameter, said disc member and side plate member having within said circle, axially aligned holes for the mounting of the planet wheels between said members and on their inner faces an annular abutment surface, completely surrounding the holes in the respective member, for laterally guiding the planet wheels, the abutment surfaces having been machined in the radial direction up to a machining diameter which is smaller than the diameter of said circle and larger than the outer diameter of said annular abutment surfaces in the regions between said webs.

2. A planet wheel carrier as claimed in claim 1, wherein each abutment surface in the region between said webs adjoins radially a depression, the radial boundary lines of which lie in a plane of the adjacent end faces of the webs.

3. A planet wheel carrier, substantially as herein described with reference to and as shown in the accompanying drawings.

VENNER, SHIPLEY & CO.,
Chartered Patent Agents, Rugby Chambers,
2, Rugby Street,
London, WC1N 3QU.
Agents for the Applicants.

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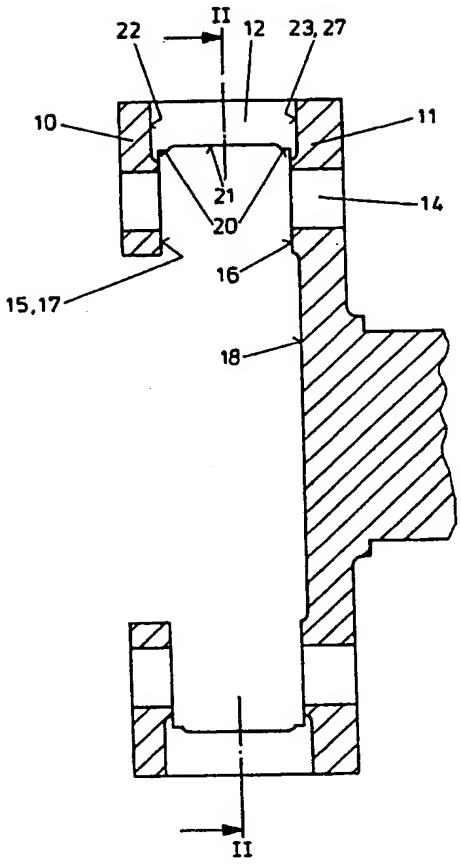
Sheet 1

FIG. 1



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Sheet 2

FIG. 2